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Michigan Department of Community Health
Bureau of Laboratories

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Updates from the Laboratory Director

Frances Pouch Downes, Dr. P.H.

FIRST VRSA ISOLATE IDENTIFIED IN MICHIGAN

In June 2002 the first isolate of vancomycin resistant *Staphylococcus aureus* (VRSA) was isolated almost simultaneously by two Michigan clinical microbiology laboratories. Both isolates were identified in specimens from the same patient tested at the two facilities. In 1997 the first isolates of *S. aureus* with reduced susceptibility to vancomycin were identified in the United States. (MMWR 51(26)) A Michigan microbiology laboratory identified one of these isolates. (N. Eng. J. Med. 340:493-501)

Does this history of first isolations indicate that Michigan is a hotbed of antimicrobial misuse and resistance? A more convincing explanation is that these Michigan laboratories maintain excellent test quality and are aware of the public health threat of VRSA. This awareness led to early notification of preliminary results to the MDCH Bureau of Laboratories where confirmatory testing was initiated. Upon confirmation the Centers for Disease Control and Prevention (CDC) was notified of the novel results and the isolates were forwarded to CDC. Testing at CDC and MDCH continued around the clock to identify the mechanism of resistance and monitor for spread of organism beyond the index case. [**Note:** The MDCH laboratories operate outside routine hours whenever urgent testing is indicated: outbreak investigations and response, bioterrorism investigation and other critical testing (e.g., rabies, botulism)].

Clinicians and microbiologists have predicted the emergence of VRSA for almost a decade. Since the introduction and widespread use of antimicrobial agents, *S. aureus* has demonstrated the ability to acquire multiple resistance mechanisms through genetic transfer from other organisms. Genetic studies of the Michigan VRSA isolate indicate that one of the genetic determinants of resistance in vancomycin resistant enterococci (VRE) did transfer to *S. aureus*. The concern now turns to if and when VRSA can follow methycillin resistant *S. aureus* and transition from strictly a nosocomial pathogen to one that is also frequently community acquired.

BIOTERRORISM UPDATE

MDCH has received $27.1 million in federal funding to build emergency response infrastructure. These funds will build infrastructure in seven areas: preparedness planning and response, surveillance and epidemiology, biological laboratory, development and support of an emergency communication network for health, public risk communications and medical and health professional training. The biological laboratory support will enable the Bureau of Laboratories to continue training and coordination with A level (i.e., clinical or hospital) laboratories throughout the state by continuing the current on-site training and adding testing workshops. To support B level public health laboratories in Kent, Saginaw and Kalamazoo counties, the city of Detroit and MDCH-Houghton, Oakland county public health laboratory will join the laboratory response network as a B level laboratory accepting suspect isolates from Oakland county clinical and hospital laboratories. The funds will support specimen transport. The funding will also build resources at the MDCH Lansing laboratory for testing environmental specimens and providing statewide confirmatory testing. MDCH will continue to serve as one of five national regional laboratories for testing clinical specimens for chemical agents. MDCH will have continued support to build collaborations between public health and clinical laboratories and provide enhanced training opportunities.

Special thanks to the clinical and hospital laboratory partners who assisted in planning the biological laboratory response plan that led to this comprehensive and ambitious plan: William Brown, DMC University Laboratories; William LaBar, (Hospital Consolidated Laboratories); Richard VanEnk, (Bronson Methodist Hospital); Dean Lonnie King and Willie Reed, College of Veterinary Medicine Michigan State University; Aloysius Hanson and Judith West, City of Detroit Health Department, Barbara Weberman, Oakland County Health Department, Tammy Theisen, Saginaw County Health Department, Carol Vanderwahl and Ken Terpstra Kent County Health Department; Cindy Overcamp,

Kalamazoo County Human Service Department; Bob Avery, Michigan Department of Environmental Quality. Their willingness to share their expertise, insight and time is greatly appreciated and demonstrates the vitality of the public health and clinical laboratory partnerships in Michigan. I also want to thank Dr. Jim Rudrik and Jim Butler, MDCH, for their coordinating efforts.

MDCH has established the Office Public Health Preparedness and Planning directed by Dr. Jackie Scott, formerly Director of the Division of Chemistry and Toxicology Division. Dr. Scott and her staff will coordinate statewide efforts in planning and coordinating with health professionals, hospitals, law enforcement and emergency response with state and local public health efforts. We extend our congratulations and appreciation for accepting this responsibility to Dr. Scott and her staff.

Ready or Not, VRSA is Here

Martha Boehme, MT(ASCP)
Division of Infectious Diseases

Is your laboratory ready for VRSA? The recent isolation of vancomycin-resistant *Staphylococcus aureus* in Michigan is a golden opportunity to review susceptibility testing practices. MIC determinations, by broth or agar dilution, or Etest, are the gold standards for testing vancomycin susceptibility in *Staphylococcus aureus*. Check the numerical MIC values as well as the interpretations on all *S. aureus* isolates. (An MIC of 4 will "flag" as susceptible). Any *S.* aureus with MIC 4ug/ml or greater should be considered a potential VISA/VRSA.

Laboratories not performing MICs, screen *S. aureus* for reduced vancomycin susceptibility with the commercial vancomycin screening agar (BHI agar with 6 ug/ml vancomycin), commonly used for VRE. This is available from major media suppliers and is easy to use:

1. Prepare 0.5 McFarland suspension of the isolate.
2. Inoculate 10 Fl of suspension onto BHI-vanco agar.
3. Incubate full 24 hours at 35 deg C in ambient air (no CO_2).
4. Examine carefully using both reflected and transmitted light.
5. QC strains for this agar: *S. aureus* ATCC 29213 or 25923 (susceptible) and *Enterococcus faecalis* ATCC 51299 (resistant).
6. >1 colony = positive (resistant) result. Ignore growth if only one colony.

Disk diffusion testing by itself is not adequate for detecting vancomycin intermediate strains of *S. aureus* (VISA). Any isolate with a zone diameter of 14 mm or less should be tested by an MIC method. Acceptable methods include 1) Microscan Walkaway/auto/touchscan system using conventional methods, 2) Vitek, 3) Etest, 4) Sensititre, 5) Pasco, 6) other broth dilution methods, and 7) agar dilution. Be aware that some rapid automated methods are also not recommended. Review the manufacturer's product information.

Determine that all suspicious isolates are pure cultures. Many a presumptive VRSA is actually an MRSA mixed with VRE or *Lactobacillus*. This is the rationale for including a purity plate in MIC testing. Confirm the identification to genus and species. Go back to the basics: perform Gram's stain, catalase and repeat the coagulase. Colony morphology can be deceiving. Recheck the susceptibility, preferably by MIC method. Once an isolate is confirmed as *S. aureus* with an MIC of >= 4 ug/ml (or +growth on BHI-vanco agar), notify the MDCH laboratory immediately at 517-335-8067. Forward the isolate to MDCH for confirmation and further testing.

Bioterrorism Readiness

Valerie Reed, RM(ASM),M(ASCP)
Bioterrorism Preparedness Program

In September 2000, a survey was sent to facilities across Michigan to identify laboratories willing to participate in the Laboratory Response Network as Level A labs. These labs are the first line of defense should a bioterrorism (BT) event occur. In December 2000, the first lab received an in-service on the microbiological agents of primary concern for use as potential weapons of bioterrorism. Since then, more than 950 microbiologists, physicians and other health care personnel in more than 100 labs in the state have received this training.

The completion of the first phase of this training by September 2002 does not mean that the process is complete. It is important that the microbiologists in Michigan maintain the highest level of readiness for any public health emergency, bioterrorist or otherwise. In order to assure that Michigan is prepared, future training is in the works including transport and shipping protocols, updates to Level A procedures and new procedures for other potential BT organisms. During the statewide Level A training many participants requested additional in-service regional meetings and wet workshops. These, too, are in the planning stages. For those laboratories that do not do extensive microbiological work, training for the proper collection, transport and shipping of potential bioterrorism specimens is also forthcoming.

Laboratorians in Michigan are to be commended for their dedication to the health and safety of the public. Just as important are those colleagues, support staff and administrators who made this training possible by handling STATS, answering calls and keeping the lab running while others attended the training. It is reassuring to know the public is in such dedicated hands.

Please contact reedv@michigan.gov or phone 517-335-9653 for additional information on this program.

Antimicrobial Resistant Salmonella on the Rise

Martha Boehme, MT(ASCP)
James Rudrik, Ph.D.
Division of Infectious Diseases

The June 28 MMWR described a 2002 outbreak of multidrug-resistant (MDR) *Salmonella* Newport involving 47 patients in five states, including Michigan. The isolates are resistant to multiple drugs, including ceftriaxone.

Background: In 1997, 1,584 of 34,608 (4.6 percent) laboratory-confirmed *Salmonella* infections reported to CDC were due to *S.* Newport. By 2001, this number had increased to 3,152 of the 31,607 (10 percent) reported *Salmonella* infections. In 2001, *S*. Newport was the third most common *Salmonella* serotype in the U.S. and the fourth most common in Michigan. (In Michigan, *Salmonella* Typhimurium remains number one, followed by Enteritidis and Heidelberg.) The increase in *S.* Newport infections appears to be associated with the emergence of MDR strains.

Highly multidrug-resistant strains of *S.* Newport were first reported in 1999. These strains show resistance or decreased susceptibility to at least nine of 17 antibiotics routinely tested in CDC's National Antimicrobial Resistance Monitoring System (NARMS): amoxicillin/clavulanate, ampicillin, cefoxitin, ceftiofur, cephalothin, chloramphenicol, streptomycin, sulfamethoxazole and tetracycline. In one study, 71 percent were also intermediate or resistant to ceftriaxone, a third generation cephalosporin widely used as the treatment of choice for invasive *Salmonella* infections in children. Because of the importance of ceftriaxone in human medicine and the need to distinguish this type of resistance from other MDR phenotypes, these strains are now referred to as Newport MDR-AmpC. In addition to the resistance patterns noted above, some Newport MDR-AmpC isolates are also resistant to trimethoprim, in which case the only oral treatment option is a fluoroquinolone.

Multidrug resistance *Salmonella* Typhimurium DT104, emerged as a significant cause of infection in the U.S. in the mid 1990's. This serogroup B organism is frequently resistant to ampicillin, chloramphenicol, streptomycin, sulfonamide and tetracycline. Resistance to ciprofloxacin and, to a lesser extent, ceftriaxone also appears to be emerging in these isolates and is being closely monitored by the CDC. Beginning in January, 2002, NARMS increased its surveillance to include testing of retail meat and poultry. An increase in ciprofloxacin-resistant DT104 in the U.K. prompted World Health Organization experts in 1997 to recommend prudent use of antimicrobials in animals. Congress recently proposed legislation banning the use of non-therapeutic fluoroquinolones (approved since 1995 for poultry) and phasing out non-therapeutic use of eight other antimicrobials in animals.

Mechanism: Newport MDR-AmpC isolates carry a plasmid encoded gene that produces AmpC-type enzymes, which confer resistance to beta-lactam/beta-lactamase inhibitor combinations (e.g., amoxicillin/clavulanate), cephamycins (e.g., cefoxitin) and expanded-spectrum cephalosporins (e.g., ceftiofur and ceftriaxone). Thus it is possible that this resistance could be transferred to other organisms. *S.* Typhimurium DT104 isolates have multiple resistance genes located closely together on the chromosomal DNA, an efficient arrangement found in many gram-negative bacteria that suggests one-step transfer of multi-drug resistance is probable.

Sources: Since 1999, nationally there have been 14 reported clusters and outbreaks caused by Newport MDR-AmpC. Michigan experienced two outbreaks in 2001. Epidemiological investigations implicated farm animal contact or raw milk consumption. Outbreaks in other states have been linked to dairy farm exposure or consumption of soft Mexican or Mediterranean cheeses made from unpasteurized milk. The 2002 cases are linked to consumption of undercooked ground beef.

The increase in *Salmonella* Newport further demonstrates the importance of veterinary surveillance. The USDA has isolated Newport MDR-AmpC from both ill and healthy animals, including cows, horses, pigs and dogs. Veterinary outbreaks have been reported in the northeastern, mid-western and western states. Newport MDR-AmpC is unusual in that it can cause significant mortality in both adult and young animals. It may be treated inappropriately if veterinarians and farmers are not aware of the multiple-resistance pattern. (See related article in this issue on James Averill, D.V.M., page 4)

Lab Implications: It is important that clinicians be made aware of these multiple-resistant *Salmonella.* Laboratories that perform serogrouping should watch for *Salmonella* serogroups B and C2 and inform the physician of the possibility of DT104 or Newport MDR-AmpC. *Salmonella enterica* is generally a self-limiting disease and treatment, if needed, is often prescribed empirically. Susceptibility testing is indicated for invasive infections. NCCLS recommendations for *Salmonella* isolated from sources other than stool state that only ampicillin, a quinolone, trimethoprim-sulfamethoxazole, chloramphenicol and a third-generation cephalosporin should be tested and reported. First and second- generation cephalosporins and aminoglycosides may appear active *in vitro* but are not effective clinically and should not be reported. If susceptibility testing is done on a fecal isolate, only ampicillin, a quinolone and trimethoprim-sulfamethoxazole should be tested and reported.

Multidrug-resistant strains of *Salmonella* have been associated with longer hospitalizations, increased morbidity and mortality and may be less responsive to traditional empiric therapy. Microbiology laboratories serve as a major source of infectious disease information to the medical community and can help raise awareness that these strains are present in Michigan. Laboratories also contribute directly to the understanding of outbreaks and developing resistance by submitting *Salmonella* isolates to MDCH for definitive serotyping.

Veterinarian Joins MDCH Laboratory Team

Patricia A. Somsel, Dr.P.H.,
Division of Infectious Diseases

James Averill, D.V.M., has joined MDCH working on a special project funded by CDC. Dr. Averill will be spending months in the microbiology section working with Dr. James Rudrik and his staff, learning bench procedures to isolate, identify and serogroup common enteric pathogens, such as Salmonella, Shigella, *E. coli* O157:H7 and Campylobacter. Additionally, he will learn the basics of susceptibility testing by Kirby Bauer and MIC methods. After he is thoroughly versed in the world of stool culture and susceptibility protocols, he will follow isolates submitted by clinical laboratories to the molecular biology section. Dr. Jeffrey Massey and his staff in that section perform pulsed field gel electrophoresis (PFGE) to identify clones causing disease within Michigan. This allows for comparison of the clones by the national PulseNet System, which greatly enhances the ability of epidemiologic investigations to identify specific foods associated with cases in multiple states.

The aim of this activity is to prepare Dr. Averill for the goal of the grant, a bridge between our public health laboratory, the state veterinarian reference laboratory at MSU, the Animal Health Diagnostic Laboratory (AHDL) and large animal veterinarians. He will review the data generated from susceptibility testing performed at AHDL and produce an antibiogram to share with veterinarians. CDC believes veterinarians can play an essential role in efforts to address the problem of antibiotic resistance in society and has funded this demonstration project for the next four to five years to test their belief. Currently, veterinarians do not have the benefit of population-based antibiotic susceptibility statistics, basing their therapy predominantly on empiric experience. If this service is well-received by veterinarians in Michigan, the program may be duplicated in other states with large agricultural industries and a strong public health laboratory.

Tick-borne Diseases

John Dyke, Ph.D.
Bureau of Laboratories

Tick-borne diseases have become significant public health problems over the last several years. The geographic distribution continues to expand to areas not previously recognized. There are currently four major tick-borne diseases seen in the Midwest. These are Lyme disease, Ehrlichiosis, Babesiosis and Rocky Mountain spotted fever.

The diagnosis of these diseases is important since they are treatable. If left untreated they have the potential to cause severe complications. Clinically, there are more asymptomatic to mild cases than symptomatic cases seen. The diagnosis of acute cases is often a challenge since patients present with nonspecific symptoms. These include headache, fever and generalized myalgia. Studies have confirmed that patient history regarding a tick bite is often unreliable. The diagnosis is further complicated by the fact that serologic testing is plagued by nonspecific reactions and cross-reactions to unrelated microorganisms.

The black-legged tick, *Ixodes scapularis,* transmits *Borrelia burgdorferi*, the agent of Lyme disease. The nymph is the stage that is most likely to transmit the disease to humans. In Michigan, pockets of Lyme borrelia are known to be endemic in the upper peninsula. Recently, *Ixodes* ticks were identified on the west coast of the lower peninsula. Two sero-positive dogs and a culture positive chipmunk have been found in the lower peninsula.

The clinical disease has been divided into three stages: stage one, a characteristic skin lesion erythema migrans; stage two, neurological or cardiac; stage three, arthritis. The diagnosis of Lyme disease is made by the presence of the erythema migrans skin lesion, culturing of the agent or through serologic assays. The interpretation of serological results continues to be controversial in many clinical settings.

There are two clinical forms of Ehrlichiosis seen in humans. *Ehrlichia equi* is the agent associated with human granulocytic ehrlichiosis (HEG) and is transmitted to man by *Ixodes scapularis*. The second form of Ehrlichiosis is human monocytic ehrlichiosis (HME). *Ehrlichia chaffeensis* is the causative agent of HME and is transmitted by the lone star tick, *Amblyomma americanum*. Both HEG and HME are rarely encountered in Michigan and those cases that are seen are believed to have been acquired outside of Michigan. The clinical disease is characterized by fever, headache, myalgia, vomiting, nausea and chills.

Babesiosis is a protozoan disease caused by *Babesia microti*. It is also transmitted to humans by *Ixodes scapularis*. *B. microti* is a hematoprotozoa that undergoes asexual reproduction within erythrocytes. Patients clinically present with malaria-like symptoms. The diagnosis is made by the examination of Giemsa stained blood smears demonstrating intraerythrocytic parasites. Cases of babesiosis are infrequently seen in Michigan and most case reports are associated with travel to endemic areas on the east coast.

In contrast to its name, Rocky Mountain Spotted Fever (RMSF) is more highly endemic in the Eastern United States than in the West. The American dog tick, *Dermacentor variabilis*, transmits the causative agent, *Rickettsia rickettsii*. Transmission of *R. rickettsii* from the tick to humans can occur as soon as three to five hours following attachment. Consequently, rapid removal of ticks is an important prevention measure. The onset of symptoms begins between two and 14 days and is manifest by fever, headache and generalized myalgia. The rash associated with RMSF appears between three and five days after the onset of fever. The rash first appears on the body extremities and later moves to the trunk. Classically, the rash has a distribution that involves the palms and soles. The majority of cases are seen between May and September. Michigan averages three reported cases per year, all of which have been associated with travel to endemic areas. The laboratory diagnosis of RMSF is primarily based upon paired sera analysis.

MDCH offers testing specific for Lyme disease, Ehrlichiosis and Babesiosis. Specimens for RMSF should be submitted to MDCH for submission to CDC for testing.

MDCH National HIV Testing Day

Deborah Stephens, MT (ASCP)
HIV Unit

On Thursday, June 27, 2002 MDCH Bureau of Labs participated in the Centers for Disease Control and Prevention's 8th Annual National HIV Testing Day. The goal of the day is to test clients who normally would not have considered being tested for HIV. Nearly 750,000 cases of AIDS have been diagnosed since the epidemic began two decades ago. Most Americans have never been tested for HIV, according to a poll published in AIDS Patient Care and STD's. (2002; 16:293-299). The study's author, Dr. Joseph Inungu, states that only 30 percent of adults in the United States have been tested for HIV in the last 20 years.

Since 1997, MDCH has taken part in the National HIV Testing Day utilizing the OraSure testing device, which tests for HIV-1 using oral mucosal transudate as a specimen source.

Specimens collected during the National Testing Day arrive in the laboratory over a two week period. For the months of April and May, 2002, MDCH averaged 88 OraSure specimens per working day. In June and July the figures rose to 94 and 135 respectively. The most specimens arrived on July 1 and 2, with 359 and 499 respectively tested each day. Reactive (positive) OraSures run approximately 14 per month, with the exception of July, with 30 reported as reactive. The total of OraSure specimens received from June and July of this year was 1883 and 2979 respectively. The increase of 1,096 was due to the national testing day.

Newborn Screening Laboratory Will Get New Database

Harry C. Hawkins, B.S.
Division of Chemistry and Toxicology
Newborn Screening Unit

A new database in the newborn screening laboratory is becoming a reality. The laboratory tests dried filter paper blood samples from all babies born in Michigan for seven disorders that can cause developmental disabilities or death if not detected and treated. Newborn screening is more than just laboratory testing. It is a comprehensive program to ensure that babies, identified in the laboratory with potential problems, get proper medical care and follow-up.

Since January 2002, MDCH staff have been working closely with Perkin Elmer Life Sciences of Norton, Ohio, on database system requirements. The work has been painstaking but exhilarating in view of the improvement in the process of statewide newborn screening. This software is more than just a database. It is a laboratory information system that tracks specimens throughout the testing process. It notifies the follow-up staff of babies identified through screening who need further attention.

The current blood collection form will be changed and results will no longer be mailed back as checked boxes. Hospitals and other submitters may choose to receive reports via FAX, mail or electronic mail. The automated mailers are expected to greatly improve turn around time.

At this time, the full schedule of testing, validation and implementation is still incomplete. The plan is to have the new system up and running by July 2003. The newborn screening program will share frequent updates on this exciting new system as events unfold.

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A Case History:

In 1999, a patient of Laotian decent, in his mid 30's, presented to the ER with a spontaneous bloody pneumothorax. His serum blood glucose level was 180MG/DL. The rest of the metabolic panel results were within normal limits. His CBC, automated differential revealed high levels of neutrophils (13.77 X10^3/Fl), monocytes (2.82 X10^3/Fl) and eosinophils (0.49 X10^3/Fl). The percentage of lymphocytes was low (8 percent) while the percentage of monocytes was elevated (15 percent). The rest of the CBC automated differential was within normal limits. The patient was otherwise healthy, had no visible trauma and had no other symptoms. He was admitted to the hospital where his lung was re-inflated and a chest tube was inserted. The patient developed a bloody pleural effusion and a temperature of 102EF. It was determined that the patient had developed a *Staphylococcus aureus* infection. He was treated with appropriate antibiotics and released. A follow-up chest x-ray three months later showed inflammatory lesions in both lower lung lobes. The patient had no other symptoms. He was scheduled for biopsy but failed to show. In May of 2002, the patient presented complaining of chronic cough, shortness of breath and hemoptysis (bloody sputum). A chest film showed inflammatory lower lobe lung lesions. Sputum specimens were sent to MDCH for mycobacteriology and mycology testing. What infectious agents would be considered (i.e., the differential diagnosis for a patient presenting with these signs and symptoms)?

For the answer to this case report see "Something Odd", page 6

Something Odd Found in Mycology

Sandy Arduin MT(ASCP) -
Mycobacteriology/Mycology Unit

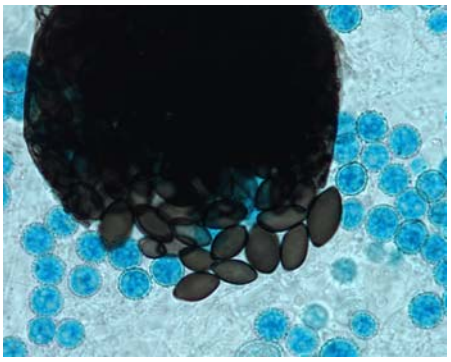
The case history showed a patient with a history of a bloody pneumothorax and subsequent chronic cough, shortness of breath, hemoptysis (bloody sputum) and inflammatory lung lesions on x-ray. The differential diagnosis of infectious agents might include tuberculosis, blastomycosis, histoplasmosis, coccidioidomycosis, pneumocystis, stongyloidiasis and hypersensitive pneumonitis. In May of 2002 a sputum specimen was submitted to MDCH for mycobacteriology and mycology testing. On the mycology KOH direct prep parasite eggs were observed. The following is a picture of the parasite egg found as viewed at 100X magnification.

The parasite was determined to be *Paragonimus westermani*, a lung fluke found primarily in Asia. Humans contract the infection through ingestion of raw or undercooked crabs or crayfish contaminated with *P. westermani* metacercariae. The metacercariae excyst in the duodenum. They migrate through the intestinal wall into the abdominal cavity. The larvae then migrate through or around the diaphragm into the pleural cavity and lungs. The larvae mature into adult worms which encapsulate themselves in the tissue of the lung wall. As these "cysts" rupture, discharging eggs into the bronchial secretions, the patient develops a cough with increased production of thick blood-tinged sputum. Symptoms of infection from *P. westermani* depend upon the worm burden of the host and can be mild in patients with chronic infection. Generally a moderately high peripheral blood eosinophilia will occur. Pulmonary paragonimiasis is often misdiagnosed as pulmonary tuberculosis. The Ziehl-Neelsen stain used for a tuberculosis examination destroys Pargonimus eggs. Therefore eggs would not be observed when examining a specimen for tuberculosis.

The doctor was notified and the patient was placed on praziquantel for two days. A current x-ray shows almost complete resolution of the lung lesions. When the patient was notified of the lung fluke infection, he admitted to eating raw shellfish. He also acknowledged having a previous history of problems with lung flukes. He had been previously treated with praziquantel, but with only homeopathic doses. After the current course of praziquantel at the correct dosage the patient states he feels better than he has in years.

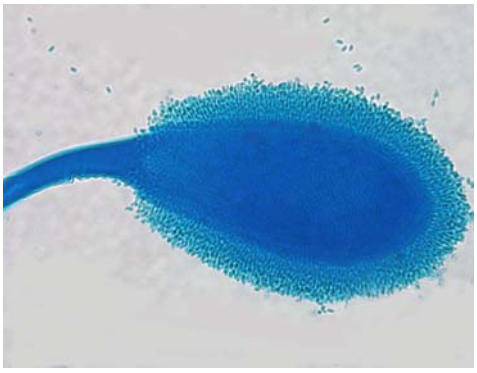
Fun Fungi...

Last Issue's Picture Quiz Answer



The photo was a picture of *Corynascus sepedomium*. Colonies are fast growing, golden yellow and velvety. Microscopically tuberculate macroconidia form on short stalks; no microconidia are formed. Ascocarps are globose, brown and lack peridial hairs. Asci contain eight spores. Ascospores are brown, smooth walled, ellipsoidal to broadly fusiform. There is a distinct germ pore at each end.

This Issue's Picture Quiz: What Mould is this?



FUN FUNGI.....

Differentiating *Histoplasma capsulatum* From *Sepedomium* spp.

Sandy Arduin MT(ASCP) & Bruce Palma MT(ASCP) - Mycobacteriology/Mycology Unit

Histoplasma capsulatum

Histoplasmosis is a disease caused by the fungus, *Histoplasma capsulatum*. The disease is not communicable, is generally asymptomatic, but may occasionally produce chronic lung infections or disseminated disease in immunocompromised individuals. It is contracted by inhaling fungal spores found in soil contaminated with bird or bat fecal droppings. Soil mixed with bird or bat dropping is a prime breeding ground for the fungus. *H. capsulatum* has been cultured from soil beneath roosting sites of starlings, grackles, red-winged black birds, pigeons, blackbirds and bats, as well as poultry housed with dirt floors. Fresh bird droppings found on sidewalks or windowsills have not demonstrated evidence of contamination with *H. capsulatum* and have not been shown to present a health risk for histoplasmosis in humans. Bats, on the other hand, can be infected with *H. capsulatum*, which may be excreted in their fecal droppings. In the United States, *H. capsulatum* is endemic to the central and eastern states, especially along the Ohio and Mississippi River valleys and the St. Lawrence River.

H. capsulatum is a dimorphic fungi which forms a yeast phase at 37EC and a mould phase at 25EC. At 25EC growth is slow and appears wooly to granular. The color is white, becoming brownish with age on the surface and yellowish on the reverse. Microscopically the hyphae are septate and hyaline. Microconidia are unicellular, hyaline, smooth or rough and develop on short stalks from the undifferentiated hyphae. Macroconidia are unicellular, hyaline, thick walled, smooth or warty (tuberculate). At 37EC growth is slow and the texture is membranous to creamy. Both the surface and reverse are cream colored. Microscopically, small budding yeast cells are seen. *H. capsulatum* will convert to the yeast phase on enriched media such as cysteine agar. Conversion to the yeast phase is difficult and can take up to four weeks. A more rapid method of confirmation is the DNA genetic probe test. Using very little growth, the DNA probe test can be completed in as little as one and one half hours.

***Sepedomium* spp**.

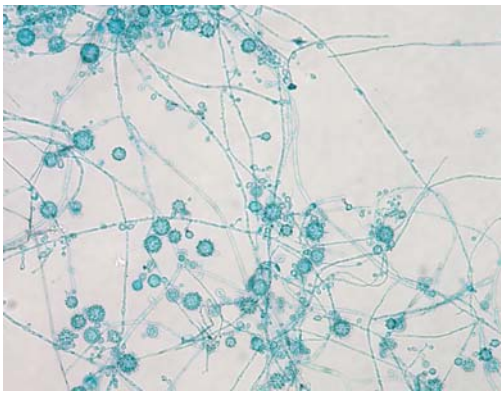
Sepedomium spp. are soil saprophytes and are usually considered contaminants when recovered from human clinical specimens. This fungi is white to golden yellow in color, grows rapidly, and has a wooly texture. Microscopically, the hyphae are septate and hyaline. Conidia are unicellular, globose, thick walled, warty and formed terminally. *Sepedomium* macroconidia are vary similar in appearance to *H. capsulatum* macroconidia. Typically *Sepedomium* spp. do not form microconidia. A few strains do produce microconidia but they are more elongated and cigar-shaped rather than spherical like those found in *H. capsulatum*.

Differentiating *Histoplasma* from *Sepedomium*:

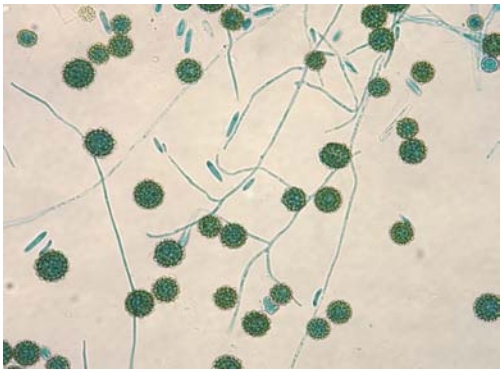
The following chart was obtained from CAP's 1999 final critique of survey set F-A.

	H.capsulatum	*Sepedomium*
Converts to yeast form at 35E-37EC	+	0
Regularly produces spherical to clavate microconidia	+	0
Mature colonies routinely grow rapidly in 3-5 days	0	+
Growth is inhibited on media containing cycloheximide	0	+
H or M exoantigens detected in the exoantigen test	+	0
Reacts with specific nucleic acid probe against *H. capsulatum*	+	0

***Histoplasma capsulatum* with microconidia**



***Sepedomium spp*. with microconidia**



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Bureau of Laboratories Welcomes New Virology Section Manager

Hema Kapoor, M.D., S.M.(NRM) has accepted the position of Virology Section Manager as of September 3, 2002. She will be responsible for overseeing the bacterial and parasitology serology, viral isolation and identification, HIV and rabies testing. Kapoor comes to MDCH from the Mayo Clinic in Rochester, Minnesota where she was a fellow in molecular and clinical microbiology through the department of microbiology.

Kapoor received her M.D. in 1981. After her internship, Kapoor continued her education with a three year residency in microbiology at Lady Harding Medical College in New Delhi, India. Kapoor was then on the faculty of Safdarjang Hospital and RML Hospitals in New Delhi.

From January 2000 until January 2001, Kapoor was at the All India Institute of Medical Sciences studying molecular and immunology techniques. She developed a PCR-RFPL method for rapid identification of Mycobacterial species from cultures and sputum specimens. This work was presented at the American Society of Microbiology meeting in Salt Lake City in May.

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